

Appl. No. 10/656,343
Amdt. Dated 11/18/2005
Reply to Office action of August 18, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

What is claimed is:

1. (currently amended) A method of providing high peak power in a pulse laser system, comprising:

providing a low-power, pulsed seed beam ~~having a small beam diameter~~;

providing a pumped gain medium between cavity mirrors for creating a pumped region in the pumped gain medium;

directing the seed beam through a central portion of the pumped region in the pumped gain medium for a plurality of non-collinear pre-amplification passes to produce an intermediate beam wherein the beam diameter of the pre-amplification passes is small in the pumped gain medium;

changing the beam diameter of the intermediate beam to produce a re-collimated intermediate beam having a beam diameter in the pumped gain medium that is large; and

using retro mirrors in combination with the cavity mirrors for redirecting the re-collimated intermediate beam through a central portion of the pumped region of the pumped gain medium for at least one non-collinear power amplification pass to produce a high-power output beam.

2. (currently amended) A method according to claim 1, further comprising:

directing the re-collimated intermediate beam through a central portion of the pumped region of the pumped gain medium for multiple non-collinear power amplification passes to produce a high-power output beam.

3. (currently amended) A method according to claim 1, further comprising:

spatially filtering the intermediate beam while ~~increasing~~ changing its effective diameter.

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4. (original) A method according to claim 1, wherein:

the number of power amplification passes is less than or equal to the number of pre-amplification passes.

5. (original) A method according to claim 4, wherein:

the number of pre-amplification passes is seven (7).

6. (currently amended) A method according to claim 1, further comprising:

controlling the re-collimated intermediate beam ~~diameter~~ for power amplification passes so that ~~it~~ its beam diameter in the pumped gain medium is closely matched to a diameter of a ~~a~~ the pumped region of the pumped gain medium.

7. (original) A method according to claim 1, wherein:

the pumped gain medium is a Ti:Sapphire crystal.

8. (currently amended) A single-stage, high peak-power femtosecond kilohertz laser system comprising:

a pumped gain medium between cavity mirrors for creating a pumped region in the pumped gain medium;

means for accepting an input pulse;

means for directing the input pulse through a central portion of the pumped region in the pumped gain medium for a plurality of non-collinear pre-amplification passes to produce an intermediate beam wherein the beam diameter of the pre-amplification passes is small in the pumped gain medium;

means for re-collimating the intermediate beam to produce a larger effective beam diameter in the pumped gain medium to produce a re-collimated intermediate beam; and

means in combination with the cavity mirrors for ~~re~~directing the re-collimated intermediate beam through a central portion of the pumped region of the pumped gain medium for at least one non-collinear power amplification pass to produce a high-power output beam.

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9. (currently amended) A system according to claim 8, further comprising:

means for directing the re-collimated intermediate beam through a central portion of the pumped region of the pumped gain medium for multiple non-collinear power amplification passes to produce a high-power output beam.

10. (currently amended) A system according to claim 8, further comprising:

a spatial filter for grooming the intermediate beam while ~~increasing~~ changing its effective diameter.

11. (currently amended) A system according to claim 8, wherein:

the number of power amplification passes is less than or equal to the number of ~~power~~ pre-amplification passes.

12. (original) A system according to claim 11, wherein:

the number of preamplification passes is seven (7).

13. (currently amended) A system according to claim 8, further comprising:

means for closely matching the diameter of the re-collimated intermediate beam during power amplification passes through the pumped gain medium to a diameter of a the pumped region of the pumped gain medium.

14. (original) A system according to claim 8, wherein:

the pumped gain medium is a Ti:Sapphire crystal.

15. (currently amended) A single-stage, high peak-power femtosecond kilohertz laser system comprising:

a gain medium;

at least one pump laser beam creating a pumped region in the gain medium;

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cavity mirrors disposed upon opposite sides of the pumped gain medium, defining a cavity within which multiple passes of a signal beam through the pumped gain medium can occur;

an input mirror for directing an input beam into the cavity, and retro mirrors in combination with the cavity mirrors to control beam path and trajectory for multiple non-collinear pre-amplification passes through a central portion of the pumped region to produce an intermediate beam;

a periscope for shifting an intermediate beam resulting from multiple pre-amplification passes;

a lens system for re-collimating the intermediate beam to produce a re-collimated intermediate beam with increased effective beam diameter in the pumped gain medium;

one or more mirrors for directing the re-collimated intermediate beam back into the cavity for one or more non-collinear power amplification passes through a central portion of the pumped region of the gain medium; and

an output mirror for directing a high-power beam out of the system.

16. (canceled) ~~A system according to claim 15, further comprising:~~

~~retro mirrors for controlling beam path and trajectory within the cavity.~~

17. (currently amended) A system according to claim 15, further comprising:

a spatial filter associated with the re-collimating lens system for grooming the intermediate beam while ~~increasing~~ changing its effective diameter.

18. (new) A system according to claim 17, wherein:

the spatial filter is an aperture disposed at a focal point in the re-collimating lens system.